

# George Washington & Jefferson National Forest's Travel Analysis Summary Report

**February 2014**

Lee Ranger District  
North River Ranger District  
Glenwood Pedlar District  
James River Ranger District  
Warm Springs Ranger District  
Eastern Divide Ranger District  
Mount Rogers National Recreation Area  
Clinch Ranger District

## **Validation:**

The enclosed travel analysis complies with Forest Service manual direction and assesses the current forest transportation system and identifies issues and addresses benefits, problems, and risks to inform decisions related to identification of the minimum road system per 36 CFR Part 212.5(b)(1) and the designation of roads, trails and areas for motor vehicle use per 36 CFR Part 212.51. [7712]

## **Objective:**

The Travel Analysis Process (TAP) is intended to identify opportunities for the national forest transportation system to meet current or future management objectives, and to provide information that allows integration of ecological, social, and economic concerns into future decisions. The TAP is consistent across the Forest but is tailored to local situations and landscape/site conditions at the District level.

The outcome of the TAP is a set of recommendations for the forest transportation system. A thorough Travel Analysis supports subsequent National Environmental Policy Act (NEPA) processes, allowing individual projects to be more site-specific and focused, while still addressing cumulative impacts.

This document provides all the road data along with a summary of process used, determinations, findings and concerns raised, used to conduct the analysis and produce the set of recommendations.

## **Intent:**

The Travel Analysis Process (TAP) is intended to be a broad scale comprehensive look at the George Washington and Jefferson National Forests transportation network. The main objectives of the TAP are:

- Balance the need for access while minimizing risks by examining important ecological, social, and economic issues related to roads;
- Furnish maps, tables, and narratives that display transportation management opportunities and strategies that address future access needs, and environmental concerns;

- Identify the need for changes by comparing the current road and motorized trail system and areas to the desired condition;
- Make recommendations to inform travel management decisions in subsequent NEPA documents.

Travel Analysis Process results will assist the George Washington and Jefferson National Forests in addressing issues related to its transportation system. It will be used to support the Forest Plans, inform future analyses, decisions, and specific actions. This will be a working document and available to help direct program advice, prioritize maintenance and project funding to high risk routes, and support regional project requests.

#### **Process Plan:**

TAP is conducted at the Forest and District level. Forest and District Interdisciplinary Teams (IDT) established that represent a comprehensive skill set able to analyze all aspects of the transportation system. See Appendix XX for listing of team members.

- a) The Forest IDT established the process with 7 District Teams conducting road analysis on each road segment, applying risk / benefits, economics and recommending minimum roads.
- b) Forest utilized skills of established George Washington Forest Plan IDT to determine process and risk / benefits, maximizing efficiency.

#### **Risk / Benefit Determination:**

- 1) Forest IDT utilized a science based approach prescribed by 36 CFR 212.5(b)(1), addressing questions at the forest level from publication FS-643, "Roads Analysis". See Appendix XX.
- 2) Forest IDT analyzed results and identified critical areas that are most relevant to the George Washington and Jefferson National Forests to help determine what risks and benefits should be used to analyze each road.
- 3) Forest IDT identified the following Risks and Benefits to be used in analyzing each road:
  - a) RISKS: Wildlife, Sediment Delivery, Invasive Plants, Aquatic Passage, Public Safety, Law Enforcement
  - b) BENEFITS: Resource access, Recreation access, Fire / Emergency access, Wildlife / Plants
- 4) Forest IDT established criteria for each risk and benefit based on a high, medium, or low metric. See Appendix XX.
- 5) Forest IDT established ratings of High, Medium and Low and scoring ranges to use, to help establish contrast between the road segments based on the risk and benefits. This contrast was set to a decision matrix which helped the District teams formulate their recommendations and identify risks that need to be mitigated.
- 6) District IDT's were afforded the opportunity to refine each risk or benefit based on local conditions.

#### **Cost Determination:**

- 1) Capacity to afford Minimum Road System is being analyzed.

- 2) Engineer estimates by Forest IDT used for each maintenance activity per FS handbooks by maint level.
- 3) For purpose of the analysis, a contract based organization was assumed, using a fixed cost / overhead maximum of 20%, realizing all Districts are organized differently and may prove more or less efficient. Efficiency was not analyzed.
- 4) Costs include gross amounts to conduct minimum maintenance activities AND administrative costs (road management, fixed costs, program management)
  - a) Actual overhead varies by District based on amount of in house, force account work conducted.
- 5) Costs field verified for accuracy.
- 6) For purpose of the analysis, all road segments are assumed to currently be at an acceptable maintenance standard, realizing deferred maintenance needs on the ground have not been met and vary by District.

Average Cost per Mile per Year table derived from Forest Service Maintenance Prescription Guidelines (FSH 7709.58)

Average Cost per Mile per Year									
Maintenance Activity	Contract or Est Unit Cost per Mile	Frequency	Assumptions	ML 1	ML 2	ML 3	ML 4 Aggregate	ML 4 Asphalt	ML 5
Grading / Ditching / Shoulders	\$ 462	Once per year ML 2, Twice per year ML 3,4, Shoulders once per 5 years ML 5	Actual contract costs = \$385/mi and \$165/mi for surface grading. Add 20% OH.		\$ 462	\$ 924	\$ 924	\$ 92	\$ 92
Aggregate Surface Replacement	\$ 7,176	Spot surface 1/8 mile per year ML 3; 1/4 mile /yr ML 4	Replace all agg surfacing once every 8 yrs - 1"x8"x1 mile = 130yd*3 = 260T - #3 agg = \$26/T, #27 = \$23/T			\$ 897	\$ 1,794		
Shoulder Replacement	\$ 3,588	ML 5 only once per 8 years	Replace evry 5 yrs - 2"x2"x1 mile=65yd*3 - 130T. Add OH - #3 agg = \$26/T, #27 = \$23/T						\$ 449
Asphalt Repair	\$ 37,110	Pot hole repair, crack sealing, chip sealing, re-surface 8yr cycle	Average contract cost 50% chip seal, 50% overlay contracts within last 5 years.					\$ 4,639	\$ 4,639
Drainage Repair/Replacement	\$ 2,664	One >36" CMP per mile per 3.5 years (forest replacement need 360/yr)	Avg culvert 45' length, 48" cost = \$1260, \$600 equip time, 8 people hours = \$360; total replacement = \$2220		\$ 350	\$ 761	\$ 761	\$ 761	\$ 761
Drainage Repair/Replacement	\$ 1,104	One <36" CMP per Mile per 5 years ML 3-5; - ML 2 dips 1/2 culvert costs; ML 1 random.	Avg culvert 45' length, 24" cost = \$540, \$200 equip time, 4 people hours = \$180; total replacement = \$920; contract costs = \$30/lf 24" pipe	\$ 50	\$ 110	\$ 221	\$ 221	\$ 221	\$ 221
Sign Replacement/Repair	\$ 300	1 per mile per 10 yrs ML 2; 1 per mile per 5 yrs ML 3-4; 1 per mile per year ML 5	Average single sign replacement cost = \$250		\$ 30	\$ 60	\$ 60	\$ 60	\$ 150
Gate Install / Repair	\$ 3,500	Once per 5 years per 5 mile road segment lvl 3; every 2 yrs for lvl 2	Gate vandalism is higher on lvl 2 remote roads. Gate can include earthen berm.		\$ 350	\$ 140			
Vegetation Removal, Mech	\$ 1,170	Mechanical - once per 5 years ML 3,4 & 5, once per 8 years ML 2	Contract costs avg = \$965/mi		\$ 146	\$ 234	\$ 234	\$ 234	\$ 234
Vegetation Removal	\$ 306	Herbicide once per 4 years	Force Acct Herbicide cost = \$75/mi, 4 person hours per mile = \$175, equip cost = \$0.82 / mile		\$ 77	\$ 77	\$ 77	\$ 77	\$ 77
Hazard Tree Removal	\$ 318	Annual	Force Acct Crew - 6 person hours per mile = \$262; equip cost = \$3.40 / mile			\$ 318	\$ 318	\$ 318	\$ 318
Mitigation to Higher Maintenance Standards needed to mitigate higher traffic or environmental degradation		Cost per mile assumed at \$1,419, difference between a 3 and a 2 for drainage and spot surfacing activities. Roads needing mitigation analyzed at 40% of total maint level 2 roads.			\$ 568				
<b>TOTALS</b>				<b>\$ 50</b>	<b>\$ 2,093</b>	<b>\$ 3,632</b>	<b>\$ 4,389</b>	<b>\$ 6,402</b>	<b>\$ 6,940</b>

Notes:

- Maintenance activity, frequency and costs adapted to local conditions on the GWJ
- Cost figures are gross amounts and account for all costs to operate a maintenance program on a Forest, including overhead.
- Actual overhead varies by District based on amount of force acct work conducted; most efficient execution assumed
- Forest program overhead rate = 20%.

### Target Budget Determination:

- 1) Assumed Forest maintenance funding by chart below, based on historical averaged Road Construction and Maintenance (CMRD) budget on the GWJ.
- 2) Annual Maintenance Budget by District distributed by usage based on size of land area management (acres less wilderness)
  - Usage assumed to have equal impacts across land area, realizing impacts can vary widely based on varied use and existing conditions.
  - GWJ current roads program withholds ~\$200k to develop forest priorities to offset these impacts, directing funding / maintenance where needed. Deferred maintenance needs and forest priorities were not analyzed.
- 3) Add 30%, based on average 3 year expenditures, to account for road maintenance that gets conducted by the following:
  - Vegetation management projects - Maintenance deposits
  - Capital Investments that reduce deferred maintenance and help eliminate annual maintenance for that project area
  - Stewardship Contracting
  - Cooperative maintenance agreements (permits, communication sites, private property)
  - Grants and other (Resource Advisory Committees, Partnerships, volunteers)
  - Potential funding for high level maintenance roads through transportation bill

<b>Forest Roads Budget</b>	<b>\$ 1,250,000</b>
Forest Bridge Maintenance	\$ 180,000
Forest Road Maintenance	\$ 1,070,000

Forest Road Maint by District		% of Forest Road Maint	CMRD Budget	Target Budget
George Washington NF	Lee	11.44%	\$ 122,408	<b>\$ 159,130</b>
	Deerfield	10.53%	\$ 112,671	<b>\$ 146,472</b>
	Dry River	12.87%	\$ 137,709	<b>\$ 179,022</b>
	Warm Springs	9.89%	\$ 105,823	<b>\$ 137,570</b>
	James River	9.58%	\$ 102,506	<b>\$ 133,258</b>
	Pedlar	7.21%	\$ 77,147	<b>\$ 100,291</b>
	<b>GW Total</b>			<b>\$ 855,743</b>
Jefferson NF	Glenwood	4.42%	\$ 47,294	<b>\$ 61,482</b>
	Eastern Divide	18.20%	\$ 194,740	<b>\$ 253,162</b>
	Mount Rogers	10.51%	\$ 112,457	<b>\$ 146,194</b>
	Clinch	5.35%	\$ 57,245	<b>\$ 74,419</b>
<b>Jeff Total</b>				<b>\$ 535,257</b>
<b>Forest Total</b>				<b>\$ 1,391,000</b>

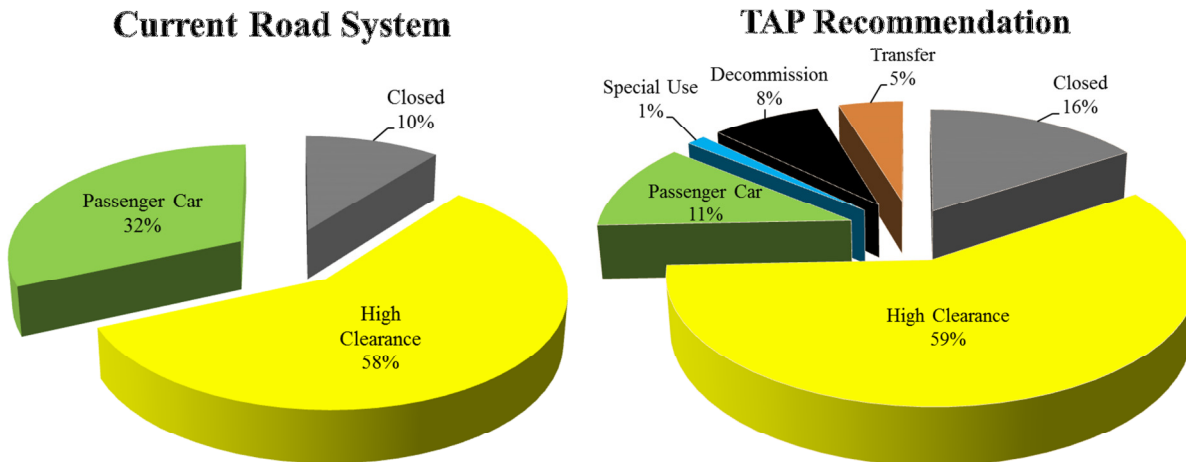
**Strategies identified to mitigate risks and reduce costs and implementation status (listed in order of most significant impact to reducing maintenance burden):**

- 1) Change maintenance jurisdiction where appropriate.
  - a) Change high use roads that serve commercial interests or private residences to public roads maintained by the State.
    - i) TAP findings used to initiate meetings with Virginia Dept of Trans and Fed Highways to add new Public Roads / Forest Highways (Forest Access Roads).
    - ii) Submitted 12 new roads for transfer to Forest Highway program - one approved in 2012 by VDOT and FedHwys, others put on hold under new transportation bill. One project submitted, pending funding decision.
  - b) Shift maintenance responsibilities to long term commercial special use permittees where appropriate.
  - c) Enter into cooperative maintenance agreements where appropriate based on needs of the agency.
    - i) Private roads: Issue Special Use Permits
    - ii) Roads open to the public with private property owners: Negotiated agreements with standards and liability clauses.
      - (1) Ie. Forest Service maintains to Lvl 2 standard while maintenance agreement permits maintenance to higher levels performed by others.
- 2) Seasonal restrictions - reduce potential for resource damage and actual expenditure of funds.
- 3) Close routes for future use.
- 4) Modify Maintenance Levels.
  - a) Lower standards: Passenger car routes to high clearance.
  - b) Raise standards: Increase maintenance level to mitigate high risks.
- 5) Decommission roads.
- 6) Schedule maintenance activities and costs over 3 years on lower used routes or higher quality roadbeds.
  - a) Recognizes that we don't need to perform all maintenance activities each year to keep routes open and / or safe.
  - b) Schedule maintenance activities over shorter time on high risk roads part of minimum road system to mitigate environmental degradation.
  - c) This strategy can be construed as accepting lower quality roads and deviating from current manual direction.
  - d) This is happening with or without the TAP either by design or neglect due to lack of resources.

## Findings - Road Composition

TAP Recommendations to changes in road composition as summarized below:

George Washington & Jefferson NFs Roads	Current Condition	TAP Recommendations	Change from Current	% Change from Current
Forest Service Road (FSR) - Maint Level 1	312	466	154	49%
FSR - Maint Level 2	1,699	1,731	32	2%
FSR - Maint Level 3	733	285	(448)	-61%
FSR - Maint Level 4	188	55	(133)	-71%
FSR - Maint Level 5	9	-	(9)	-100%
Special Use Maintained (FS needed)		21	21	0%
<b>Total Minimum Road System</b>	<b>2,941</b>	<b>2,558</b>	<b>(383)</b>	<b>-13%</b>
Special Use Maintained (Not needed by FS)		20		
Decommission		237		
Transfer Jurisdiction		139		



## Findings - Economics

Current road system is funded at 43% of total maintenance funds needed in order to fully maintain to objective standards.

Implemented TAP recommendations would meet budget expectations for funding maintenance to objective standards as summarized below:

MRS Summary	Min Road System Budget	Current Miles	Current Maint Need	Current % Need Funded	Minimum Road System	Min Road System Maint Need	TAP % Need Funded	% Miles Reduced	% Costs Reduced	Total Cost Reduction
GWJ Totals	\$ 1,391,000	2,941	\$ 3,270,339	43%	2,558	\$ 1,400,306	99%	13%	57%	\$ 1,870,033
	Total Reduction in Mileage			383						

## IDENTIFYING ISSUES

- 1) Keeping roads well maintained at a higher standard may be more economical than downgrading where traffic is high.
  - a) This needs further study and may not be realized in a spreadsheet or powerpoint.
  - b) Once drainage is compromised more costly repairs are required to re-establish road prism
  - c) A policy of retreat to lower road standards needs to be balanced with a demand for higher maintenance efficiencies.
- 2) Potential loss of ERFO funds – All level 2 roads are technically NOT eligible to receive emergency repair funding through Federal Highways (ERFO).
  - a) Recent storm events in 2013 were approved for level 2 roads that are open to the public. Interpretation of the regulations by FedHwys is inconsistent and depends solely on one individual reviewing the sites.
  - b) The RO/WO needs to resolve this issue with FedHwys prior to pushing a comprehensive downgrade strategy.
- 3) All passenger car routes (ML 3 and up) are subject to the Highway Safety Act.
  - a) Act requires roads designed and maintained at minimum standards for accident prevention
    - i) Signing may be our biggest issue as all level 3 roads and higher are subject to the Manual on Uniform Traffic Control Devices.
  - b) The Forest Service and Line Officers may be held liable for accidents on level 3 roads and higher where the road is not maintained at the appropriate standard.
- 4) Cost reductions strategies increase potential resource damage risks. Reduction in Maintenance level may increase sedimentation.
  - a) This strategy needs further study. ie. Is it more economical to keep higher standards for roads that need to be open?
  - b) Is it more economical to pull culverts and replace with dips and fords? What is impact to watershed?
  - c) High risk roads can have higher priority for project and maintenance funding and may need to be higher ML.
  - d) High risk roads need to be surveyed to apply best mgmt practices for drainage features (see FS guide for implementing the lowering of National Forest System Roads to Maintenance Level 2 - San Dimas TDC.)
  - e) Decreasing road standards without reducing traffic can cause more significant and costly repairs.
- 5) Increased vegetation management costs with lower road maintenance standards. Need to use vegetation management projects to upgrade roads.

***(We are simply shifting the financial burden to another program area.)***

  - a) Strategies could directly conflict in timber sale areas and result is less marketable sales more costly management activities.
- 6) Many roads are recommended at higher standards than need indicates. Identifying Perceived Political Realities (PPR) surrounding road levels - perceived because it is CHANGEABLE.
  - a) This analysis and report BEGINS the process to change realities on the ground that shape perception.
  - b) Obtain internal buy in to complete analysis divorced from PPR and "need creep".
    - i) Roads that are only needed at a level 2, but recommended higher based on PPR.
  - c) Use findings to develop communication plans and get the word out. Communicate, communicate, and communicate.
- 7) INFRA road data is not adequately integrated with GIS - INFRA IS CURRENTLY A BUST to do this work
  - a) All databases should be "spatial centric" - ie. FACTS/Fsveg.

- b) At a minimum, segment lengths and begin and end mile posts need to match to use GIS road layer as a useful tool.
- c) Recommend use of user created fields in infra with TAP analysis column data to be able to map ALL.
- d) Better yet: Recommend new module or expand RMO with TAP data.
- e) THEN develop and use of ArcMap toolbar to dynamically link GIS/Infra.
- f) Allows IDTs to graphically conduct analysis and create/edit records.
- 8) Units need road maintenance funding innovation and agreement support.
  - a) More flexibility to waive liability or permit private maint - Manual direction is outdated and largely "selectively neglected".
  - b) New funding Mechanisms - stamps, permits, fees.
- 9) Units need support transferring maintenance jurisdiction.
  - a) Obstacles at National and State level could be chased by RO/WO.
- 10) Maintenance Organizational Efficiency and Effectiveness.
  - a) Focus of TAP is on capacity to maintain size of infrastructure based on organizational assumptions and efficiencies.
  - b) The Forest Service needs to be approaching our maintenance capabilities in terms of infrastructure size AND our organizational efficiency. The GWJ established a 22% overhead rate which is far lower than 2012 actual level of 55%. TAP is a trigger for this Forest to examine its road maintenance organization and implement changes.
  - c) Sub-units that are currently efficient in their maintenance activities can demonstrate a greater capacity to maintain a larger infrastructure.
  - d) Recommend Washington Office (WO)/Regional Office (RO) establish parameters for Forests on maintenance efficiencies - Focus TAP on both capacity and efficiency.
    - i) Establish policies to minimize forest and regional risk during budget downturns.
    - ii) Analyze effectiveness of force account vs. contract work by maintenance activity .
    - iii) Cap fixed costs at 22-40%.
    - iv) Minimize program requirements outside of actual maintenance activities.
    - v) Regional or Multi-Forest program positions - INFRA, GIS, Bridge & Maintenance Engineers.
    - vi) Maximize maintenance funding to the roads.
    - vii) Make budget targets meaningful - Use TAP as the catalyst to change.
      - (1) 1 mile maintained = ALL activities conducted to standard.
      - (2) Tie funding allocations to meaningful targets.
- 11) IMPLEMENTATION IS HARD TO DO
  - a) Some items are staff intensive (agreements / permits), and end up as lower priority.
  - b) MUST be driven by Line.
  - c) Forests may not have the staff or time to adequately implement .
  - d) Recommend region / nationwide staff teams or Process Improvement Projects (PIPs) to fund implementation strategies.
  - e) Sample costs for the GWJ implantation:



Draft Costs for Implementation Summary 2014-2020 Listed in priority of execution	Unit Cost	Units	Total Cost	Notes
Schedule Maint Activities	na	na	-	Part of annual maintenance planning
Change in ML - Surveys	na	na	-	Phase in with random road surveys
Mapping / public mtgs	na	na	-	Part of routine program of work
Change in ML - PC to HC	600	196	117,600	Mitigation of safety & environmental issues
Seasonal Restrictions	500	200	100,000	New gates and signing, admin / contracts
Transfer Jurisdiction - admin	400	120	48,000	Scope and engineer reports
Change in ML - HC to PC	1,500	66	99,000	Upgrade to higher std to mitigate environ risk
Transfer Jurisdiction - constr	45,000	120	5,400,000	Average cost to upgrade roads @45k per mile
Decommissioning	1,500	120	180,000	Cost per mile to design and contract
Special Uses	1,000	51	51,000	Lands admin costs per mile
Totals			\$ 5,995,600	
Annual costs averaged out till 2020			\$ 856,514	

Cost to implement based on this analysis would have a 3-5 year payback with savings realized. However, costs would need to be funded outside normal maintenance program for most items.

- 12) Reduction from passenger car to high clearance roads impacting public safety and user comfort and increasing maintenance costs.
  - a) Accept some lower user comfort as a consequence. Maintain historical use of road as much as possible.
  - b) Changes in user comfort can be slowly phased in. Examples:
    - i) Maintain roadway at highest standard possible as budget and resources allow.
    - ii) Phase surface blading out over multiple years. If a route is bladed twice a year, lower to once for multiple years or as dictated by available resources. This is already happening to a large degree - 2013 blading miles are 78% lower than 2010 with lower CMRD budgets.
    - iii) Develop sign plans and install where appropriate to mitigate potential safety issues, change expectations.
    - iv) Drainage structures would be maintained through their life cycle, and then instead of replacing culverts in kind, drainage dips would be installed.
  - c) Maintain some drainage features to mitigate high risk sedimentation issues where warranted.
  - d) Actively discourage or prohibit passenger car traffic to mitigate safety issues if they arise through roadway deterioration - proactively install dips or change road prism at road entrance to physically restrict car traffic.
- 13) Recreational use - Our roads are under increasing pressure to support more recreational use including RV's and stock trailers which cannot negotiate high clearance road standards.
  - a) The TAP has identified many of these roads based on FS need for level 2.
  - b) Public need should be accounted for within reason or based on past usage, shown as developed recreation use in TAP and noted - Analysis is inconsistent here, with some districts having budget discretion to make these decisions
  - c) This will be a more contentious issue on units without as much funding discretion, able to meet target budgets.